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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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Application for Patent

Application No.: 09/401,740	:	Examiner: C. Shosho
Filed: September 23, 1999	:	Art Unit: 1714

HOT MELT INKS CONTAINING STYRENE OR TERPENE POLYMERS

BRIEF ON APPEAL

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1. **REAL PARTY IN INTEREST:**

Xerox Corporation, assignee of the present patent application.

2. **RELATED APPEALS AND INTERFERENCES:**

While the inventions in Copending Application U.S. Serial No. 09/404,570 and Copending Application U.S. Serial No. 09/401,250 are essentially unrelated to the invention of the instant application in that they are directed to

> a hot melt ink composition comprising (a) an aldehyde copolymer ink vehicle, (b) a nonpolymeric aldehyde viscosity modifier, (c) a colorant, (d) an optional conductivity enhancing agent, (e) an optional antioxidant, and (f) an optional UV absorber

and

> a hot melt ink composition comprising (a) a polyester ink vehicle which is poly(hexamethylene sebacate), poly(1,6-hexamethylene adipate), poly(vinyl cinnamate), poly(vinyl stearate), polyethylene succinate, polyethylene terephthalate, poly(vinylacetate-co-crotonic acid), sucrose octaacetate, poly(di(ethyleneglycol)/cyclohexanedimethanol-*alt*-isophthalic acid, sulfonated), or mixtures thereof, (b) a nonpolymeric ester viscosity modifier, (c) a colorant, (d) an optional colorant dispersing agent, (e) an optional conductivity enhancing agent, (f) an optional antioxidant, and (g) an optional UV absorber

respectively, all three applications are currently being appealed from decisions by the same Examiner, and some of the references cited against the present application have also been cited against these applications.

3. STATUS OF CLAIMS:

Claims 1 to 22 are rejected.

4. STATUS OF AMENDMENTS:

Appellant's Amendment After Final Rejection dated April 17, 2001 was considered by the Examiner but did not overcome the rejections.

5. SUMMARY OF INVENTION:

Appellant's invention is directed to a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber.

6. ISSUES:

A. Whether claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 are patentable under 35 U.S.C. §103(a) over Takazawa et al. (U.S. Patent 5,279,655).

B. Whether claim 3 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Nishizaki et al. (U.S. Patent 6,022,910).

C. Whether claim 6 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Tobias et al. (U.S. Patent 5,286,288).

D. Whether claim 9 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Ball (U.S. Patent 4,684,956).

E. Whether claims 10 and 11 are patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Yaegashi et al. (U.S. Patent 5,270,730), Wickramanayake (U.S. Patent 5,531,816), Malhotra et al. '117 (U.S. Patent 5,922,117), and Breton et al. (U.S. Patent 6,106,599).

F. Whether claim 15 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Shawcross et al. (U.S. Patent 6,028,180) and Bruder et al. (U.S. Patent 5,015,292).

G. Whether claim 17 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of JP 06 228 476, Yaegashi et al., and Malhotra et al. '390 (U.S. Patent 5,902,390).

H. Whether claims 1 to 5, 7 to 9, 13, and 18 to 20 are patentable under 35 U.S.C. §103(a) over Breton et al. '607 (U.S. Patent 6,045,607) in view of Takazawa et al., Ball, and Fujioka (U.S. Patent 5,397,388).

I. Whether claim 6 is patentable under 35 U.S.C. §103(a) over Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka and further in view of Tobias et al.

J. Whether claims 10 to 12 are patentable under 35 U.S.C. §103(a) over Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka and further in view of Yaegashi et al., Wickramanayake, Malhotra et al. '117, and Breton et al. '599 (U.S. Patent 6,106,599).

K. Whether claims 16 and 17 are patentable under 35 U.S.C. §103(a) over Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka and further in view of JP 06 228 476, Yaegashi et al., and Malhotra et al. '390.

7. GROUPING OF CLAIMS:

The rejected claims do not stand or fall together. Appellant will discuss the distinctions between various appealed claims

and the cited references as indicated in the headings hereinbelow. In addition, claims 4 and 8 are discussed separately with respect to the cited art under Heading A.

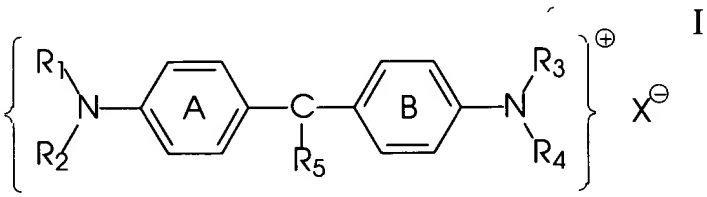
8. ARGUMENT:

The present invention is directed to a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber. Advantages of the present invention include suitability for use in acoustic ink printing processes, desirable conductivity values, desirable melting point values, melt viscosities at jetting temperatures that enable high quality ink jet printing, generation of images with excellent hardness values, change from a solid state to a liquid state in a desirably rapid period of time upon heating, desirable acoustic loss values for acoustic ink printing, desirable conductivity values for electric field assisted acoustic ink printing, generation of images with desirably low haze values, generation of images with good crease resistance, generation of images with high gloss, high solubility of dye colorants in the inks, thereby enabling prints with desirably high optical density using smaller amounts of the ink, and enabling thinner images of the ink on the substrate, generation of images with excellent scratch resistance, and other

advantages as set forth in the specification and illustrated in the examples.

A. Whether claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 are patentable under 35 U.S.C. §103(a) over Takazawa et al. (U.S. Patent 5,279,655).

Takazawa et al. discloses a printer ink composition containing a triphenylmethane dye or a lake pigment derived therefrom as a coloring agent, including as the coloring agent a triphenylmethane dye having general formula (I):



I

wherein R_1, R_2, R_3, and R_4 are independently a hydrogen atom, an alkyl group, an aralkyl group, or an aryl group, R_5 is an aryl group, X^- is a counter ion, and ring A or ring B may be substituted by one or more substituents, provided that at least one group among R_1, R_2, R_3, and R_4 is not methyl and in the case that R_5 is p-dimethylaminophenyl, at least one of R_1 and R_2 and at least one of R_3 and R_4 are not methyl; or a lake pigment derived therefrom, in order to prevent the formation of Michler's ketone. The ink composition is used for printing media for printer such as fabric ink ribbon, ink roll, ink-retaining element, thermal transfer ink ribbon, and pressure-sensitive transfer ink ribbon.

The Examiner has stated that this reference discloses a hot melt ink having a melting point of 50 to 150°C wherein the ink

contains polystyrene, 10 to 20 percent dispersant, 10 to 40 percent colorant such as dyes, 20 to 30 percent aromatic viscosity modifier, and 20 to 60 percent ink vehicle, that although there is no explicit disclosure that the polystyrene functions as a hardening component, given that the resins are identical to those presently claimed, it is clear that polystyrene functions inherently as a hardening component, and that although there is no explicit disclosure of the time required to change the ink from a solid state to a liquid state, given that the reference ink and the presently claimed ink have almost identical melting temperatures, it is clear that the reference ink will inherently change from solid to liquid in the same amount of time as presently claimed. The Examiner is of the position that this reference renders obvious the instant invention as recited in claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22.

Appellant disagrees with this position. Takazawa et al. is primarily directed to a specific colorant, and discloses the use of this colorant in various types of materials, including liquid inks, thermal transfer ribbons, and pressure sensitive transfer ribbons. The description of liquid inks, from column 6, line 41 to column 7, line 55, teaches inks containing the colorant, a non-volatile oily dissolution medium for the colorant, and, if necessary, a pigment dispersing agent and a viscosity adjusting agent, with examples of viscosity adjusting agents being mineral oils such as motor oil, synthetic oils such as olefin-polymerized oil, diester oils such as dioctyl phthalate, dioctyl sebacate, di(1-ethylpropyl) sebacate, dioctyl azelate, dioctyl adipate, and the like, and silicone oils. The portions of the reference referred to by the Examiner at column 6, lines 46 to 50 (mentioning a dissolution medium for the dye or a

dispersion medium for the pigment as a main component, and, if necessary, a pigment dispersing agent and a viscosity adjusting agent) and at column 7, lines 20 to 29 (mentioning component amounts of coloring agent 10 to 40 percent by weight, dye dissolution or pigment dispersion medium 20 to 60 percent by weight, pigment dispersing agent 0 to 40 and preferably 10 to 20 percent by weight, and viscosity adjusting agent 0 to 40 and preferably 20 to 30 percent by weight) refer to the liquid ink embodiment. The description of solid inks for thermal transfer ink ribbons mentions, at column 8, lines 1 to 23, that the vehicle is composed of a wax-like substance or a mixture of a wax-like substance and a thermoplastic resin, with examples of the thermoplastic resin including ethylene-vinyl acetate copolymer, petroleum resin, polyvinyl acetate, polystyrene, styrene-butadiene copolymer, and acrylic resin. At column 8, lines 32 to 33, the reference states that the ink composition preferably has a melting or softening temperature of about 50° to about 150°C. Nothing in this reference, however, teaches or suggests a solid ink, or a hot melt ink, or a phase change ink, that contains a nonpolymeric aromatic viscosity modifier.

In response to Appellant's position to the effect that Takazawa et al. discloses the use of a viscosity modifier in a liquid ink but not in a solid ink, the Examiner has stated that Takazawa et al. teaches at column 7, lines 65 to 68 that in the solid ink conventional vehicles and others can be used without any particular change, that it is the Examiner's position that conventional vehicles and others encompasses such vehicles as those disclosed in column 6, lines 43 to 53 of the reference wherein the disclosed vehicle includes a viscosity modifier,

and that there is no disclosure in the reference that viscosity modifiers are excluded from the solid ink.

Appellant disagrees with this position. The reference clearly states at column 7, lines 56 and 57, that "(h)ereinafter, the solid ink composition of the present invention will be explained." (emphasis added) At column 7, lines 65 to 68, the reference states that "(w)ith respect to the solid ink for such uses, conventional vehicles and others can be used without any particular change except that the specified coloring agent as mentioned above is used as the coloring agent." Immediately thereafter, in column 8, lines 1 to 23, the reference states: "Hereinafter, a first explanation will be given for the one-time thermal transfer ink ribbon. The vehicle of solid ink for the ribbon is preferably a vehicle composed of a wax-like substance as a main component or a vehicle composed of a mixture of a wax-like substance and a thermoplastic resin as a main component. Examples of the wax-like substance include natural waxes such as carnauba wax, whale wax, haze wax, bees wax, lanolin, montan wax and ceresine wax; petroleum waxes such as paraffin wax and microcrystalline wax; synthetic waxes such as low molecular weight polyethylene, oxidized wax and ester wax; higher fatty acids such as lauric acid, myristic acid, palmitic acid, stearic acid and behenic acid; higher aliphatic alcohols such as stearyl alcohol and behenyl alcohol; esters such as higher fatty acid monoglycerides, sucrose fatty acid esters and sorbitan fatty acid esters; and amides such as oleic amide. One or more kinds of these wax-like substances are appropriately used. Examples of the thermoplastic resin include ethylene-vinyl acetate copolymer, petroleum resin, polyvinyl acetate,

polystyrene, styrene-butadiene copolymer and acrylic resin. One or more kinds of these resins are appropriately used." (emphasis added) Subsequent portions of the reference discuss inks for use in multi-use thermal transfer ribbons, one-time use pressure-sensitive ribbons, and multi-use pressure-sensitive ribbons. The statement at the bottom of column 7 to the effect that "conventional vehicles and others can be used without any particular change except that the specified coloring agent as mentioned above is used as the coloring agent" clearly refers to conventional vehicles commonly used in one-time use and multi-use thermal transfer and pressure-sensitive transfer ribbons, as discussed at the top of column 8 and subsequent portions of the reference, and does not refer to conventional vehicles commonly used in liquid inks, which were discussed previously in the reference.

Further in response to Appellant's position to the effect that Takazawa et al. discloses the use of a viscosity modifier in a liquid ink but not in a solid ink, the Examiner has stated that Takazawa et al. "is an especially relevant reference against the present claims given that, in addition to the disclosure of a solid ink comprising polystyrene, dispersant, colorant, and ink vehicle, it is significant to note that col. 9, lines 41-48 of Takazawa et al. disclose that the solid ink composition contains plasticizing agents such as dioctyl azelate, dioctyl sebacate, and dioctyl phthalate which are identical to the viscosity adjusting agents disclosed in col. 7, lines 7-8 of Takazawa et al., i.e. plasticizing agents clearly function as viscosity adjusting agents, so it would have been obvious to one of ordinary skill in the art that the solid ink of

Takazawa et al. do (sic) contain aromatic viscosity adjusting agents as presently claimed."

Appellant disagrees with this position. As the Examiner has stated, the passage cited is directed to solid inks. More specifically, one-time use pressure-sensitive ribbons are discussed from column 9, lines 41 to 62. This portion of the reference mentions that mineral oils, animal or vegetable oils, plasticizing agents, or liquid surface active agents are added to the solid ink composition when the inks are used in one-time use pressure-sensitive ribbons. Examples of plasticizers include paraffin oil, rapeseed oil, castor oil, dioctyl azelate, dioctyl sebacate, diethyl phthalate, tributyl acetylcitrate, and lanolin. As the Examiner has stated, there is some overlap between the specific examples of materials listed as suitable plasticizers for solid inks to be used in one-time use pressure-sensitive ribbons and the specific examples of materials listed as suitable viscosity-adjusting agents for liquid inks, including dioctyl azelate, dioctyl sebacate, and dioctyl phthalate. Appellant, however, disagrees with the Examiner's conclusion that "i.e. plasticizing agents clearly function as viscosity adjusting agents, so it would have been obvious to one of ordinary skill in the art that the solid ink of Takazawa et al. do (sic) contain aromatic viscosity adjusting agents as presently claimed." That certain materials would function as viscosity adjusting agents in a liquid ink provides no suggestion to one of ordinary skill in the art that the same materials would also function as viscosity adjusting agents in a solid ink. Various materials, such as polymers and thickeners, are frequently added to liquid inks to adjust the viscosity thereof. One of ordinary skill in the art would not be justified in concluding that these polymers and

thickeners would also perform satisfactorily as viscosity adjusting agents in solid inks. A viscosity adjusting agent in a solid ink generally adjusts the viscosity of the ink when it is in its molten state; one of ordinary skill in the art would have no reason to believe that materials used as viscosity adjusting agents in liquid inks would have desirable effects on the viscosity of a solid ink in its molten state. Accordingly, Appellant remains of the position that the present invention as recited in claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 is patentable with respect to the teachings of this reference.

Additionally in response to Appellant's position to the effect that Takazawa et al. discloses the use of a viscosity modifier in a liquid ink but not in a solid ink, the Examiner has stated that given that there is nothing in Takazawa et al. which negates using aromatic viscosity modifiers in a solid ink composition, the Examiner's position remains that Takazawa et al. discloses the use of aromatic viscosity modifiers in solid ink compositions as presently claimed.

Appellant disagrees with this position. Appellant points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. In ex parte prosecution, the PTO has the burden of producing a factual basis for a rejection. In re Piasecki, 745 F.2d 1468, 223 U.S.P.Q. 785 (Fed. Cir. 1984); In re Gordon, 733 F.2d 900 (Fed. Cir. 1984). As the Court of Appeals for the Federal Circuit stated in In re Piasecki, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984): "The Supreme Court in Graham v. John Deere Co., 383 U.S. 1, 148

U.S.P.Q. 459 (1966), focused on the procedural and evidentiary processes in reaching a conclusion under section 103. As adapted to ex parte procedure, Graham is interpreted as continuing to place the 'burden of proof on the Patent Office which requires it to produce the factual basis for its rejection of an application under sections 102 and 103'. In re Warner, 379 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967)." Takazawa et al. clearly fails to teach or suggest the use of a viscosity modifier in a solid ink. Accordingly, Appellant is of the position that the Examiner has failed to establish a *prima facie* case of obviousness in the application of this reference to the instant claims.

For the foregoing reasons, Appellant is of the position that the present invention as cited in claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 is patentable with respect to this reference.

Appellant also directs the attention of the Board of Appeals to claim 8, which recites that the styrene polymer or terpene polymer hardening component is poly (α-methyl styrene), poly (vinyl toluene-co-α-methyl styrene), poly (methyl styrene-co-indene) hydrogenated, poly (styrene-co-allyl alcohol), polylimonene, poly-β-pinene, poly(coumarone-co-indene), or mixtures thereof. Nothing in Takazawa et al. teaches or suggests a hot melt ink containing these materials. Accordingly, Appellant is of the position that this claim is particularly in condition for allowance with respect to this reference.

The Examiner has stated that "although there is no explicit disclosure (in this reference) of the time required to change the ink from a solid state to a liquid state, given that the reference ink and the presently claimed (ink) have almost identical melting temperatures, it

is clear that the reference ink will inherently change from solid to liquid in the same amount of time as presently claimed." Appellant disagrees with this position. The melting point of a substance and the amount of time required for that substance to change from a solid to a liquid at the melting point are two entirely different characteristics of the substance. Nothing in Takazawa et al. teaches or suggests a hot melt ink that undergoes, upon heating, a change from a solid state to a liquid state in a period of no more than about 100 milliseconds. Accordingly, Appellant is of the position that claim 4 is also particularly in condition for allowance with respect to this reference.

In response to Appellant's position to the effect that Takazawa et al. does not disclose the time necessary for the ink to change from solid state to liquid state, the Examiner has stated that while it is agreed that the reference does not explicitly disclose the time required for the ink to change from the solid state to the liquid state, Takazawa et al. does disclose the melting point of the ink, that to the extent that the melting point represents the change from solid to liquid, and given that the melting temperature and the ink ingredients disclosed by Takazawa et al. overlap those presently claimed, it is the Examiner's position that the ink of Takazawa et al. would intrinsically change from solid to liquid in the same time as presently claimed, and that Takazawa et al. therefore remains a relevant reference against the present claims.

Appellant disagrees with this position. As stated hereinabove, Takazawa et al. fails to teach or suggest a hot melt or phase change ink of the composition recited in the instant claims. In addition, while melting point is measured in units of temperature, such as

degrees, the time required for a material to undergo a change from the solid state to the liquid state is measured in units of time, such as milliseconds. Two materials with the same melting point can have substantially different melt times. Accordingly, since Takazawa et al. fails to teach either a composition as recited in the instant claims or a hot melt or phase change ink with a melt time as recited in claim 4, Appellant remains of the position that the present invention as recited in the instant claims is patentable with respect to the teachings of this reference, viewed either alone or in combination with other references.

Further in response to Appellant's position to the effect that Takazawa et al. does not disclose the time necessary for the ink to change from solid state to liquid state and that compositions with the same melting temperature do not necessarily possess the same melting time, the Examiner has stated that while Appellant argues that compositions with the same melting temperature do not necessarily possess the same melting time, it is noted that not only does the ink composition of Takazawa et al. possess the same melting temperature as presently claimed, the ink composition of Takazawa et al. comprises the same ingredients as presently claimed, i.e. styrene resin, aromatic viscosity modifier, ink vehicle, and colorant, and that in light of this, and absent evidence to the contrary, it is the Examiner's position that the ink composition of Takazawa et al. would possess the same melting time as presently claimed.

Appellant disagrees with this position. Functional language in a claim must not be ignored. See, e.g., In re Caldwell, 319 F.2d 254, 138 U.S.P.Q. 243 (C.C.P.A. 1963). As the court held in In re

Swinehart, 439 F.2d 210, 169 U.S.P.Q. 226 (C.C.P.A. 1971), there is nothing wrong with attempting to define something (in the Swinehart case, a composition) by what it does rather than by what it is (as evidenced by specific structure or material, for example). Claims such as instant claim 4, which recites an ink that undergoes, upon heating, a change from a solid state to a liquid state in a period of no more than about 100 milliseconds, encompass only those compositions that exhibit this functional characteristic. Nothing in Takazawa et al. teaches or suggests selecting the ink ingredients so that this functional limitation is met. Accordingly, Appellant remains of the position that claim 4 is particularly in condition for allowance with respect to the teachings of this reference.

B. Whether claim 3 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Nishizaki et al. (U.S. Patent 6,022,910).

Nishizaki et al. discloses a hot melt solid ink composition comprising at least one polyamide and at least one terpene resin. The terpene resin is present in an amount of from 0.5 percent by weight to 15 percent by weight based on the total weight of the ink composition. This hot melt solid ink composition can be stable to heat upon recording using ink jet recording apparatus where ink is heated to melt at a temperature higher than ordinary temperature to make a record, and has a superior transparency and a superior adhesion to printing mediums.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of melt viscosity, that Takazawa et al. discloses the use of

viscosity modifiers but does not explicitly disclose the melt viscosity of the ink, that Nishizaki et al., which is drawn to hot melt inks, discloses that the melt viscosity of hot melt inks must be adjusted to range from 10 centipoise to 60 centipoise to prevent faulty ejection and clogging of the ink jet printer heads, and that it would have been within the skill level of one of ordinary skill in the art to adjust the viscosity of the hot melt ink of Takazawa et al. to values, including those presently claimed, to prevent faulty ejection and clogging of the ink jet printer heads and thereby arrive at the claimed invention.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 under §103 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Appellant is of the position that this reference, viewed either alone or in combination with Nishizaki et al., fails to render obvious the present invention as recited in claim 3. Nishizaki et al. teaches a hot melt ink containing a polyamide resin and a terpene resin, and teaches that the ink has a melt viscosity of from 10 cps to 60 cps. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening

component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber, and would not be led to arrive at such an ink that had a melt viscosity at jetting temperature of no higher than about 25 centipoise. Accordingly, Appellant is of the position that the present invention as recited in claim 3 is patentable with respect to these references.

C. Whether claim 6 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Tobias et al. (U.S. Patent 5,286,288).

Tobias et al. discloses a hot melt ink composition for use in continuous ink jet printing comprising an electrolyte, an electrolyte-solvating and dissociating compound, and an image-forming agent, said ink being solid at about 25°C, said ink liquefying at a temperature between 75°C and 175°C, and said ink in the liquid stage having a conductivity of greater than about 100 microsiemens/cm.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of conductivity, that Tobias et al., which is drawn to hot melt inks, discloses the use of conductivity agents to control the conductivity of the ink from 500 to 1500 microsiemens per centimeter or approximately 5.7 to 6.2 log(picomho/cm), which ensures that the ink has sufficient conductivity to be successfully ink jet printed, and that it would have been obvious to one of ordinary skill in the art to control the conductivity of the hot melt of Takazawa et al. via the conductivity

agents to produce an ink suitable for ink jet printing and thereby arrive at the claimed invention.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 under §103 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Appellant is of the position that this reference, viewed either alone or in combination with Tobias et al., fails to render obvious the present invention as recited in claim 6. Tobias et al. teaches a hot melt ink containing an electrolyte and an electrolyte solvating and dissociating compound for use in continuous ink jet printing. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber, and would not be led to arrive at such an ink that had a conductivity of no less than about 6 log(picomho/cm). Accordingly, Appellant is of the position that the

present invention as recited in claim 6 is patentable with respect to these references.

In response to Appellant's position to the effect that Takazawa et al. viewed in combination with Tobias et al. would not lead one of ordinary skill in the art to the present invention, the Examiner has stated that given that Tobias et al. is drawn to hot melt inks as are Takazawa et al. and the present claims, and further given that Tobias et al. teaches that conductivity agents are used in hot melt inks to control the conductivity of the ink to a certain level to produce an ink which is suitable for use in an ink jet printer, a function especially relevant to both Takazawa et al. and the invention at hand, it is the Examiner's position that there is ample motivation to combine Takazawa et al. with Tobias et al. and thereby arrive at the claimed invention.

Appellant disagrees with this position. As stated hereinabove, Takazawa et al. does not teach or suggest a hot melt or phase change ink of the composition recited in the instant claims; Tobias et al. fails to remedy this deficiency in the teachings of Takazawa et al. In addition, Takazawa et al. teaches solid inks for use in thermal transfer ribbons and pressure-sensitive transfer ribbons, while Tobias et al. teaches hot melt inks for use in continuous ink jet printing. The conductivity of the ink is very important in continuous ink jet printing, but nothing in Takazawa et al. teaches or suggests that the conductivity of a solid ink for use in thermal transfer ribbons or pressure-sensitive transfer ribbons is of any importance. Accordingly, Appellant remains of the position that one of ordinary skill in the art would not be motivated to combine the teachings of Takazawa et al. with the teachings of Tobias et al., and that

even if these teachings were so combined, one of ordinary skill in the art would not be led to arrive at the instantly claimed invention.

D. Whether claim 9 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Ball (U.S. Patent 4,684,956).

Ball discloses a process for applying a thermoplastic image forming composition as a series of discrete droplets from a non-contact ink jet printing apparatus to form separate drops on a substrate moving relative to the apparatus, characterized in that the molten composition is thermally stable at the temperature of application and is applied at a temperature in excess of 100°C. The process can be used to apply the molten composition to a variety of substrates using on-demand or continuous non-contact ink jet application techniques. However, the process is of special use in the application of thermoplastic inks to non-porous substrates using an on-demand ink jet printer.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of the amount of polystyrene, that Ball, which is drawn to hot melt inks, discloses the use of 25 to 55 percent polystyrene to enhance the adhesion of the ink to the substrate, and that in light of the motivation for using specific amount of polystyrene disclosed by Ball as described above, it would have been obvious to one of ordinary skill in the art to use polystyrene in this amount in the hot melt ink of Takazawa et al. to produce an ink with enhanced substrate adhesion, thereby arriving at the claimed invention.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 under §103 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Appellant is of the position that this reference, viewed either alone or in combination with Ball, fails to render obvious the present invention as recited in claim 6. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber, and would not be led to arrive at such an ink that contained the styrene polymer or terpene polymer hardening component in an amount of no less than about 0.5 percent by weight of the ink and no more than about 28 percent by weight of the ink. Accordingly, Appellant is of the position that the present invention as recited in claim 9 is patentable with respect to these references.

In response to Appellant's position to the effect that Takazawa et al. viewed in combination with Ball would not lead one of

ordinary skill in the art to the present invention, the Examiner has stated that given that Ball is drawn to hot melt inks as are Takazawa et al. and the present claims, and further given that Ball teaches amounts of polystyrene typically used in hot melt inks to control adhesion of the ink to the substrate, a function especially relevant to both Takazawa et al. and the invention at hand, it is the Examiner's position that there is ample motivation to combine Takazawa et al. with Ball and thereby arrive at the claimed invention.

Appellant disagrees with this position. As stated hereinabove, Takazawa et al. does not teach or suggest a hot melt or phase change ink of the composition recited in the instant claims; Ball fails to remedy this deficiency in the teachings of Takazawa et al. In addition, Takazawa et al. teaches solid inks for use in thermal transfer ribbons and pressure-sensitive transfer ribbons, while Ball teaches hot melt inks for use in ink jet printing. Those of ordinary skill in the ink arts would not be led to believe that one ingredient in one specific ink designed for use in ink jet printing should be taken and added to another specific ink designed for use in thermal transfer ribbons and pressure-sensitive transfer ribbons. Further, since the specific ink designed for use in thermal transfer ribbons and pressure-sensitive transfer ribbons (as disclosed in Takazawa et al.) does not resemble the inks recited in the instant claims, even if these references were viewed in combination, one of ordinary skill in the art would not be led to arrive at the instant invention.

Further in response to Appellant's position to the effect that one of ordinary skill in the art would not be motivated to combine

the teachings of Takazawa et al. with the teachings of Ball, the Examiner has stated that given that Ball is drawn to hot melt ink as is Takazawa et al., and further given that Ball teaches the use of the same type and amount of resin presently claimed, i.e. styrene resin, and absent evidence to the contrary, it is the Examiner's position that there is ample motivation to combine Takazawa et al. with Ball.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require Appellant to provide "evidence to the contrary" when no *prima facie* case of obviousness has been established. The PTO has the burden under section 103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988). Since the Examiner has failed to make such a showing, Appellant remains of the position that the instant claims are patentable with respect to the teachings of these references.

E. Whether claims 10 and 11 are patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Yaegashi et al. (U.S. Patent 5,270,730), Wickramanayake (U.S. Patent 5,531,816), Malhotra et al. '117 (U.S. Patent 5,922,117), and Breton et al. (U.S. Patent 6,106,599).

Yaegashi et al. discloses a normally solid recording material that is heat-melted in a path defined by a nozzle leading to an ejection outlet and is imparted with a thermal energy from a heater corresponding to a recording signal to generate a bubble. As a result, a droplet of the recording material is ejected out of the ejection outlet under the action of the bubble while the bubble is caused to communicate with ambience. The normally solid recording material preferably contains a colorant, a first heat-fusible solid substance having a melting point Tm of 36°-150°C and a boiling point Tb of 150°-370°C, and a second heat-fusible solid substance having a melting point Tm and a solidifying point Tf satisfying a relationship of Tm-Tf≤30°C. The distance between the heater and the ejection outlet, the sectional size of the nozzle and the thermal energy imparted by the heater are controlled to cause the bubble to communicate with ambience.

Wickramanayake discloses bleed control and fast dry times in pigment-based ink-jet ink compositions by formulating the ink compositions to include at least one appropriately modified pigment in a water-insoluble organic compound, which is microemulsified with an amphiphile and water. The pigment-based ink jet ink compositions are bleed-free and fast-drying and exhibit the inherent waterfastness of pigments. Moreover, the use of a modified pigment improves print quality by passivating the pigment particles to eliminate agglomerations

between the particles and by providing pigment particles of substantially uniform size, thereby yielding more uniform thickness and coverage on a print medium. The pigment-based ink jet ink compositions offer the best qualities of pigments as colorants while reducing or eliminating the problems conventionally associated therewith.

Malhotra et al. '117 discloses an ink composition comprising (1) a liquid alcohol vehicle, (2) a solid alcohol compound, (3) a quaternary compound, (4) a lightfastness UV absorber, (5) a lightfastness antioxidant, and (6) a colorant.

Breton et al. '599 discloses an ink composition comprising (1) an azole compound, (2) a viscosity compound, (3) a lightfastness component, (4) an antioxidant, and (5) a colorant. The reference teaches that, in inks containing an azole compound, suitable viscosity compounds include (a) compounds containing one nitrogen in the cyclic ring, such as (1) 2-acetyl pyrrole; (2) 1-(2-aminophenyl)pyrrole; (3) 1-(phenylsulfonyl)pyrrole; (4) acetyl-1-(phenylsulfonyl)pyrrole; (5) methyl 5-(benzyloxycarbonyl)-2,4-dimethyl-3-pyrrole propionate; (6) ethyl 3,4-diethyl-5-methyl-2-pyrrole carboxylate; (7) 5-bromoindole; (8) methylindole; (9) 3-(2-bromoethyl)indole; (10) 5-chloro-2-methylindole; (11) (3-(dimethylamino methyl) indole); (12) indolyl acetate; (13) 5-methoxy-2-methyl indole; or (14) 1-(phenylsulfonyl)indole; (b) compounds containing two nitrogens in the cyclic ring, such as imidazoline derivatives such as (1) 2-methyl-2-imidazoline; (2) 2-benzyl-2-imidazoline; (3) 2-phenyl-2-imidazoline; (4) 1-ethyl-2-benzimidazolinone; (5) 1,3-diacetyl-2-imidazolidinone; or (6) 1-(p-tosyl)-3,4,4-trimethylimidazolidine; and (c) derivatives containing a nitrogen and a sulfur atom in the ring,

such as thiazole compounds such as (1) 2-aminothiazole; (2) 2-amino-5-methylthiazole; (3) ethyl 2-amino-4-thiazole acetate; (4) ethyl 2-(formylamino)-4-thiazole acetate; (5) 2-amino-4-phenyl-5-tetradecylthiazole; (6) S-2-benzothiazolyl 2-amino-α-(methoxyimino)-4-thiazole thioacetate; (7) 1-aminobenzothiazole; or (8) 2-(methylsulfonyl) benzothiazole.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of specific type of viscosity modifier, that Yaegashi et al., which is drawn to hot melt inks, discloses the use of heat fusible substances such as dibenzofuran and 4-methylbiphenyl to produce an ink with excellent dischargeability, storability, and little blotting, that Wickramanayake, which is drawn to ink jet inks, discloses the use of phenanthrene as a solvent for the colorant and to prevent crust formation and nozzle clogging in the printer and that although there is no disclosure of other specific types of phenanthrene one of ordinary skill in the art would have recognized that the broad disclosure of phenanthrene encompasses the use of specific types of phenanthrene such as those presently claimed and that the choice of these specific types of phenanthrene would have been within the bounds of routine experimentation, that Malhotra et al. '117, which is drawn to hot melt inks, discloses the use of 1-adamantane ethanol to ensure that the ink has low acoustic loss to minimize or reduce energy consumption of the printer and to generate high quality, lightfast, and waterfast images, that Breton et al. '599, which is drawn to a hot melt ink, discloses the use of phenylsulfonyl compounds to adjust the viscosity of the ink, and that in

light of the motivation for using dibenzofuran, biphenyls, phenanthrene, and 1-adamantane ethanol disclosed by Yaegashi et al., Wickramanayake, Malhotra et al. '117, and Breton et al. '599, it would have been obvious to one of ordinary skill in the art to use these compounds in the hot melt ink of Takazawa et al. to produce a workable ink with excellent dischargeability, storeability, little blotting, which minimizes energy use with regards to the printer and does not clog the printer nozzles, thereby arriving at the claimed invention.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 under §103 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Appellant is of the position that this reference, viewed either alone or in combination with Yaegashi et al., Wickramanayake, Malhotra et al. '117, and/or Breton et al. '599 fails to render obvious the present invention as recited in claims 10 and 11.

In addition, Appellant points out that Wickramanayake is directed to a liquid ink jet ink composition. One of ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific viscosity modifiers recited in claims 10 and 11 of the

instant application would be suitable materials for modifying the melt viscosity of a hot melt ink composition of the present invention.

Further, nothing in Breton et al. '599 teaches or suggests the use of 1,2-bis(phenylsulfonyl) ethylene, bis(phenylsulfonyl) methane, 1-bromomethyl-2-((phenylsulfonyl) methyl) benzene, or 2-(phenylsulfonyl)tetrahydropyran as viscosity modifiers in solid inks. In addition, nothing in this reference teaches or suggests the addition of viscosity modifiers to ink compositions as recited in claim 1.

Additionally, Appellant points out that Yaegashi et al. discloses a solid ink ("recording material") that comprises a heat fusible solid substance and a colorant, and can optionally contain additives for adjusting ink properties and a normally liquid organic solvent such as an alcohol. Dibenzofuran and 4-methylbiphenyl are listed, among many other materials, as examples of the heat fusible solid substance. Nothing in this reference teaches or suggests that these materials, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as viscosity modifiers to modify the viscosity of the molten ink.

Appellant also points out that while Malhotra et al. '117 teaches an ink containing 1-adamantane ethanol, nothing in this reference teaches or suggests that this material, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as a viscosity modifier to modify the viscosity of the molten ink.

For these additional reasons, Appellant is also of the position that Takazawa et al., viewed either alone or in combination with

Yaegashi et al., Wickramanayake, Malhotra et al. '117, and/or Breton et al. '599 fails to render obvious the present invention as recited in claims 10 and 11.

In response to Appellant's position to the effect that Wickramanayake is drawn to liquid inks and thus there is no motivation to combine this reference with the solid ink reference of Takazawa et al., the Examiner has stated that given that it is well known in the art that hot melt inks contain liquid vehicles and further given, as disclosed in Takazawa et al., that the ingredients for liquid inks and solid inks overlap, i.e. viscosity modifier, colorant, dispersant, etc., it is the Examiner's position that there is ample motivation to combine Wickramanayake with Takazawa et al.

Appellant disagrees with this position. Nothing in the cited references teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Similarly, while Takazawa et al. teaches that the colorant which is the subject thereof can be used in both liquid inks and in solid inks for thermal transfer ribbons and pressure-sensitive transfer ribbons, nothing in this reference teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Liquid ink jet inks and solid ink jet inks have different characteristics, different requirements, and different design difficulties; those of ordinary skill in the art would not be led to the conclusion that one specific component of one specific liquid ink should be taken and added to

another specific solid ink, or that by so doing advantageous results would occur.

Further in response to Appellant's position to the effect that Wickramanayake is drawn to liquid inks and thus there is no motivation to combine this reference with the solid ink reference of Takazawa et al., the Examiner has stated that Appellant has provided no clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks, and that Wickramanayake is used as a teaching reference, so it is not necessary for the secondary reference to contain all the features of the presently claimed invention. The Examiner has stated that this reference teaches a certain concept, and in combination with the primary reference, discloses the presently claimed invention.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require Appellant to "provide . . . clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks". The reference cited by the Examiner fails to teach or suggest to one of ordinary skill in the art the ink compositions recited in the instant claims. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to

combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988); In re Newell, 891 F.2d 899, 13 U.S.P.Q. 2d 1248 (Fed. Cir. 1989); Ex Parte Levengood, 28 U.S.P.Q. 2d 1300 (Bd. Pat. App. & Int. 1993). The Examiner has failed to make such a showing. Appellant, accordingly, is of the position that the present invention is patentable with respect to the teachings of these references.

In response to Appellant's position regarding Malhotra et al. '117 and Yaegashi et al., the Examiner has stated that, given that 1-adamantane ethanol disclosed by Malhotra et al. '117, the dibenzofuran and 4-methylbiphenyl disclosed by Yaegashi et al., and the diphenyl carbonate and glutaric acid disclosed by Yaegashi et al. are identical to those presently claimed, it would have been obvious to one of ordinary skill in the art that the 1-adamantane, dibenzofuran, and 4-methylbiphenyl ethanol would intrinsically function as viscosity modifiers and that the diphenyl carbonate and glutaric acid would intrinsically function as dispersing agents.

Appellant points out, however, that nothing in any of these references teach that these materials should be added to an ink composition as recited in claim 1 of the present application. Those of ordinary skill in the art would not be led to the conclusion that one specific component of one specific ink should arbitrarily be taken and added to another specific ink, or that by so doing advantageous results would occur. There would be no motivation for one of ordinary skill in the art to add these materials to an ink according to claim 1 of the present application. Further, since, as discussed hereinabove, Takazawa et al. fails to teach or suggest an ink according to claim 1 of the present

application, even if these references were viewed in combination with Takazawa et al., one of ordinary skill in the art would not be led to arrive at the present invention as recited in claims 10 and 11.

Further in response to Appellant's position to the effect that one of ordinary skill in the art would have no motivation to combine the viscosity modifiers of Malhotra et al. '117 or Yaegashi et al. with Takazawa et al., the Examiner has stated that Yaegashi et al., which is drawn to hot melt inks, discloses the use of heat fusible substances such as dibenzofuran and 4-methylbiphenyl to produce an ink with excellent dischargeability, storability, and little blotting while Malhotra et al. '117, which is drawn to hot melt inks, discloses the use of 1-adamantane ethanol to ensure that the ink has low acoustic loss to minimize or reduce energy consumption of the printer and to generate high quality, lightfast, and waterfast images. The Examiner is of the position that given that both Yaegashi et al. and Malhotra et al. '117 are drawn to the same field of endeavor as Takazawa et al. and both Yaegashi et al. and Malhotra et al. '117 provide motivation for using the above described ingredients in these hot melt inks, and absent evidence to the contrary, it would have been obvious to one of ordinary skill in the art to use such viscosity modifiers in the ink of Takazawa et al. and thereby arrive at the claimed invention.

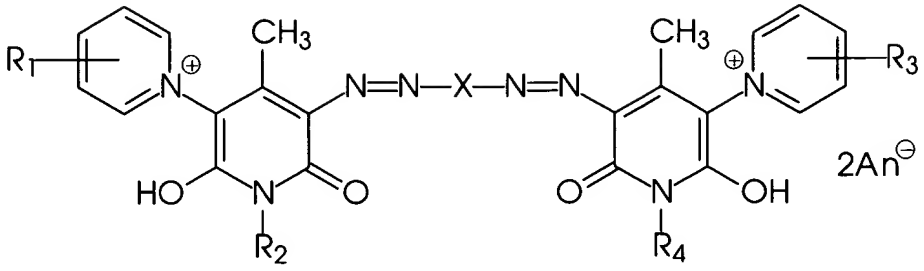
Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require

Appellant to provide "evidence to the contrary" when no *prima facie* case of obviousness has been established. The PTO has the burden under section 103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988). Since the Examiner has failed to make such a showing, Appellant remains of the position that the instant claims are patentable with respect to the teachings of these references.

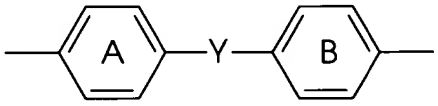
F. Whether claim 15 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of Shawcross et al. (U.S. Patent 6,028,180) and Bruder et al. (U.S. Patent 5,015,292).

Shawcross et al. discloses an ink comprising water, a water-dissipatable polymer, and one or more dyes having a benzene ring carrying a hydroxy group at each of the 1-, 3-, and 5-positions and an azo group at each of the 2-, 4-, and 6-positions or a tautomer thereof. Also claimed are certain dyes, compositions printer cartridges and ink jet printers.

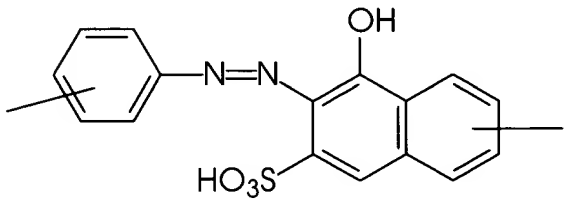
Bruder et al. discloses a recording fluid for the ink jet process that contains a water-miscible organic solvent and a dye of the formula



where R_1, R_2, R_3, and R_4 each have specified meanings, An- is an anion, and X is a bridge member of the formula



or



where Y and the rings A and B each have specified meanings.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of a specific type of ink vehicle, that Bruder et al., which is drawn to ink jet inks, discloses the use of solvents such as carboxamide to enhance waterfastness and smear resistance, that Shawcross et al., which is drawn to ink jet inks, discloses the use of solvent such as

tetrahydronaphthalene, that Shawcross et al. and Bruder et al. broadly disclose tetrahydronaphthalene and carboxamide, respectively, that although there are no specific examples of tetrahydronaphthalenes and carboxamides in either of these references, one of ordinary skill in the art would have recognized that the broad disclosure of tetrahydronaphthalene and carboxamide encompasses the use of specific types of tetrahydronaphthalene and carboxamide such as those presently claimed, and that the choice of these specific types of tetrahydronaphthalene and carboxamide would have been within the bounds of routine experimentation, and that in light of the motivation for using specific types of ink vehicles disclosed by Shawcross et al. and Bruder et al., it would have been obvious to one of ordinary skill in the art to use these ink vehicles as the vehicle in the ink of Takazawa et al. to produce an ink with enhanced waterfastness and smear resistance.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 under §103 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Appellant is of the position that this reference, viewed either alone or in combination with Shawcross et al. and/or

Bruder et al. fails to render obvious the present invention as recited in claim 15.

In addition, Appellant points out that Shawcross et al. and Bruder et al. are directed to liquid ink jet ink compositions. One of ordinary skill in the art would not gain, from a reading of these references, an understanding that the specific ink vehicles recited in claim 15 of the instant application would be suitable materials for inclusion in a hot melt ink composition of the present invention.

Further, Appellant points out that Bruder et al.'s general description of "carboxamides, such as N,N-dimethylformamide or N,N-dimethylacetamide" fails to teach or suggest a specific material such as 4-bromo-N-dodecyl-1-hydroxy-2-naphthalene carboxamide, having an acoustic-loss value of 42 decibels per millimeter and a melting point of 96°C, and that Shawcross et al.'s general description of "water-immiscible organic solvents include aromatic hydrocarbons, e.g. toluene, xylene, naphthalene, tetrahydronaphthalene and methyl naphthalene" fails to teach or suggest a specific material such as 1,5-dihydroxy-1,2,3,4-tetrahydronaphthalene. One important distinction is that N,N-dimethylformamide, N,N-dimethylacetamide, and tetrahydronaphthalene are all liquids at room temperature, whereas 4-bromo-N-dodecyl-1-hydroxy-2-naphthalene carboxamide has a melting point of 95 to 97°C and 1,5-dihydroxy-1,2,3,4-tetrahydronaphthalene has a melting point of 132 to 134°C.

For these additional reasons, Appellant is also of the position that Takazawa et al., viewed either alone or in combination with

Bruder et al. and/or Shawcross et al. fails to render obvious the present invention as recited in claim 15.

In response to Appellant's position to the effect that Shawcross et al. and Bruder et al. are drawn to liquid inks and thus there is no motivation to combine these references with the solid ink reference of Takazawa et al., the Examiner has stated that given that it is well known in the art that hot melt inks contain liquid vehicles and further given, as disclosed in Takazawa et al., that the ingredients for liquid inks and solid inks overlap, i.e. viscosity modifier, colorant, dispersant, etc., it is the Examiner's position that there is ample motivation to combine Shawcross et al. and Bruder et al. with Takazawa et al.

Appellant disagrees with this position. Nothing in the cited references teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Similarly, while Takazawa et al. teaches that the colorant which is the subject thereof can be used in both liquid inks and in solid inks for thermal transfer ribbons and pressure-sensitive transfer ribbons, nothing in this reference teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Liquid ink jet inks and solid ink jet inks have different characteristics, different requirements, and different design difficulties; those of ordinary skill in the art would not be led to the conclusion that one specific component of one specific liquid ink should be taken and added to another specific solid ink, or that by so doing advantageous results would occur.

Further in response to Appellant's position to the effect that Shawcross et al. and Bruder et al. are drawn to liquid inks and thus there is no motivation to combine these references with the solid ink reference of Takazawa et al., the Examiner has stated that Appellant has provided no clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks, and that Shawcross et al. and Bruder et al. are used as teaching references, so it is not necessary for these secondary references to contain all the features of the presently claimed invention. The Examiner has stated that these references each teach a certain concept, and in combination with the primary reference, disclose the presently claimed invention.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require Appellant to "provide . . . clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks". The references cited by the Examiner fail to teach or suggest to one of ordinary skill in the art the ink compositions recited in the instant claims. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988); In re Newell, 891 F.2d 899, 13 U.S.P.Q. 2d 1248

(Fed. Cir. 1989); Ex Parte Levengood, 28 U.S.P.Q. 2d 1300 (Bd. Pat. App. & Int. 1993). The Examiner has failed to make such a showing. Appellant, accordingly, is of the position that the present invention is patentable with respect to the teachings of these references.

In response to Appellant's position to the effect that Bruder et al. does not disclose the carboxamides recited in claim 15, the Examiner has stated that while Bruder et al. discloses preferred examples of carboxamides, nonpreferred disclosures can be used in assessing the patentability of claims, and that the fact remains that the broad disclosure of carboxamides by Bruder et al. clearly encompasses the specific carboxamides presently claimed.

Appellant disagrees with this position. There would be absolutely no motivation for one of ordinary skill in the art, upon reviewing Bruder et al., which is directed to liquid inks, to see that these inks liquid can contain carboxamides, choose some other specific carboxamides than those disclosed therein, and arbitrarily choose to put them in a hot melt or phase change ink.

G. Whether claim 17 is patentable under 35 U.S.C. §103(a) over Takazawa et al. in view of JP 06 228 476, Yaegashi et al., and Malhotra et al. '390 (U.S. Patent 5,902,390).

JP 06 228 476 discloses a recording liquid obtained by adding a solvent such as isopropyl alcohol, thiodiglycol, or 2-pyrrolidone and ion exchange water to at least one of phthalocyanine, xanthene, triphenylmethane, anthraquinone, monoazo, disazo, trisazo, and tetraazo-based dyes or a pigment, stirring and mixing the resultant

mixture, preparing a recording liquid, and further blending the prepared recording liquid with 2-oxazolidone. The recording liquid has good humectant properties, discharge stability, and resistance of a member to the recording liquid and high solubility in dyes without causing a bronze phenomenon in printed letters, and is capable of providing clear images having high image density and useful for ink jet recording.

Malhotra et al. '390 discloses an ink comprising (1) a liquid ketone, (2) a solid ketone, (3) a lightfastness UV absorber, (4) a lightfastness antioxidant, and (5) a colorant.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of a specific type of dispersing agent, that the abstract of the Japanese reference discloses the use of 2-oxazolidone to produce an ink with excellent humectant properties and discharge stability, that Yaegashi et al., which is drawn to hot melt inks, discloses the use of 2,3-dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione to produce an ink with excellent dischargeability, storability, and little blotting, that Malhotra et al. '390, which is drawn to hot melt inks, discloses the use of cyclohexanone and cyclohexanedione to control the acoustic loss value of the ink, that Yaegashi et al. and Malhotra et al. '390 broadly disclose benzaldehydes, glutaric acids, cyclohexanone, and cyclohexanedione, that although there are no specific examples of these compounds in the references one of ordinary skill in the art would have recognized that the broad disclosure of these compounds encompasses the use of specific types of these compounds such as those presently claimed, and that the choice

of these specific types would have been within the bounds of routine experimentation, that Yaegashi et al. discloses 2,3-dimethoxybenzaldehyde while the present claims require 2,6-dimethoxybenzaldehyde, that the only difference between the reference compound and those presently claimed are the position of the substituents and one of ordinary skill in the art would expect the dimethoxybenzaldehyde to function in the same manner regardless of the position of the substituents, and that in light of the motivation of using the compounds disclosed by these references, it would have been obvious to one of ordinary skill in the art to use these compounds in the hot melt ink of Takazawa et al. to produce an ink with suitable acoustic loss value, excellent humectant properties, and discharge stability, thereby arriving at the claimed invention.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, 16, 21, and 22 under §103 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Appellant is of the position that this reference, viewed either alone or in combination with JP 06 228 476, Yaegashi et al., and/or Malhotra et al. '390 fails to render obvious the present invention as recited in claim 17.

In addition, Appellant points out that JP 06 228 476 is directed to a liquid ink jet ink composition. One of ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific colorant dispersing agents recited in claim 17 of the instant application would be suitable materials for inclusion in a hot melt ink composition of the present invention.

Further, Appellant points out that Yaegashi et al. discloses a solid ink ("recording material") that comprises a heat fusible solid substance and a colorant, and can optionally contain additives for adjusting ink properties and a normally liquid organic solvent such as an alcohol. 2,3-Dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione are listed, among many other materials, as examples of the heat fusible solid substance. Nothing in this reference teaches or suggests that 2,6-dimethoxybenzaldehyde, diphenyl carbonate, 2,2-dimethyl glutaric acid, 3,3-dimethylglutaric acid, 1-(2-hydroxyphenyl)-3-phenyl-1,3-propanedione, or 1-(2-hydroxy-5-methylphenyl)-3-phenyl-1,3-propanedione, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as colorant dispersing agents. With respect to the Examiner's comment that "one of ordinary skill in the art would expect the . . . dimethoxybenzaldehyde to function in the same manner regardless of the position of the substituents," Appellant points out that 2,3-dimethoxybenzaldehyde has a melting point of 48 to 52°C and a boiling point of 137°C, whereas 2,6-dimethoxybenzaldehyde has a melting point of 96 to 98°C and a boiling point of 285°C; these

materials could be expected by one of ordinary skill in the art to behave differently in a hot melt ink.

Additionally, Appellant points out that Malhotra et al. '390 at column 1, lines 37 and 42 to 43 and column 5, line 7 teaches 4-ethylcyclohexanone and 2-acetylcyclohexanone as examples of the liquid ketone vehicle of the ink disclosed therein. While the reference further teaches at column 5, line 13 1,2-cyclohexanedione as an example of the solid ketone component of the ink disclosed therein, this teaching cannot be said fairly to teach or suggest the use of 2,6-diphenylcyclohexanone or 4,4-dimethyl-1,3-cyclohexanedione in an ink according to the present invention.

For these additional reasons, Appellant is also of the position that Takazawa et al., viewed either alone or in combination with JP 06 228 476, Yaegashi et al., and/or Malhotra et al. '390 fails to render obvious the present invention as recited in claim 17.

In response to Appellant's position to the effect that JP 06 228 476 is drawn to liquid inks and thus there is no motivation to combine this reference with the solid ink reference of Takazawa et al., the Examiner has stated that given that it is well known in the art that hot melt inks contain liquid vehicles and further given, as disclosed in Takazawa et al., that the ingredients for liquid inks and solid inks overlap, i.e. viscosity modifier, colorant, dispersant, etc., it is the Examiner's position that there is ample motivation to combine JP 06 228 476 with Takazawa et al.

Appellant disagrees with this position. Nothing in the cited references teaches or suggests that components present in liquid

ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Similarly, while Takazawa et al. teaches that the colorant which is the subject thereof can be used in both liquid inks and in solid inks for thermal transfer ribbons and pressure-sensitive transfer ribbons, nothing in this reference teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Liquid ink jet inks and solid ink jet inks have different characteristics, different requirements, and different design difficulties; those of ordinary skill in the art would not be led to the conclusion that one specific component of one specific liquid ink should be taken and added to another specific solid ink, or that by so doing advantageous results would occur.

Further in response to Appellant's position to the effect that JP 06 228 476 is drawn to liquid inks and thus there is no motivation to combine this reference with the solid ink reference of Takazawa et al., the Examiner has stated that Appellant has provided no clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks, and that JP 06 228 476 is used as a teaching reference, so it is not necessary for this secondary reference to contain all the features of the presently claimed invention. The Examiner has stated that this reference teaches a certain concept, and in combination with the primary reference, discloses the presently claimed invention.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with

the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require Appellant to "provide . . . clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks". The references cited by the Examiner fail to teach or suggest to one of ordinary skill in the art the ink compositions recited in the instant claims. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988); In re Newell, 891 F.2d 899, 13 U.S.P.Q. 2d 1248 (Fed. Cir. 1989); Ex Parte Levengood, 28 U.S.P.Q. 2d 1300 (Bd. Pat. App. & Int. 1993). The Examiner has failed to make such a showing. Appellant, accordingly, is of the position that the present invention is patentable with respect to the teachings of these references.

H. Whether claims 1 to 5, 7 to 9, 13, and 18 to 20 are patentable under 35 U.S.C. §103(a) over Breton et al. '607 (U.S. Patent 6,045,607) in view of Takazawa et al., Ball, and Fujioka (U.S. Patent 5,397,388).

Breton et al. '607 discloses an ink composition containing (1) a first solid carbamate, (2) a second carbamate with a dissimilar melting point than the first solid carbamate (1), (3) a lightfastness component, (4) a lightfastness antioxidant, and (5) a colorant.

Fujioka discloses a hot melt ink for an ink jet printer which comprises 50 weight percent or more of a solid wax that is solid at normal temperatures and has a solubility parameter of not larger than 9.00, an organic substance having a solubility parameter greater than that of the solid wax, a polymer material that is miscible with at least one of the solid wax and the organic substance and which has a weight average molecular weight of not less than 500, and a coloring material. The hot melt ink exhibits good dispersability and dispersion stability of the coloring material with good heat stability and color fastness to light.

The Examiner has stated that Breton et al. '607 discloses a hot melt ink possessing melting temperature of 60 to 150°C, melt viscosity of less than 10 centipoise, acoustic loss value of 5 to 40 decibels per millimeter, haze value of 10 to 30, wherein the ink changes from solid to liquid in about 1 to 100 milliseconds, said ink containing a colorant such as a dye, antioxidant, and UV absorber, that this reference also discloses an acoustic ink jet printing process, and that the difference between Breton et al. '607 and the present claimed invention is the requirement in the claims of (a) styrene or terpene resin and (b) aromatic viscosity modifier.

The Examiner has stated with respect to difference (a) that Takazawa et al., which is drawn to hot melt inks, discloses the use of polystyrene to produce a solid ink, that Ball, which is drawn to hot melt inks, discloses the use of 22 to 55 percent polyterpenes and methyl styrenes to enhance the adhesion of the ink to the substrate, that Fujioka, which is drawn to hot melt inks, discloses the use of 0.1 to 48 percent terpene resins and cumarone-indene resins to provide the ink high

transparency, controlled hardness, and good wear resistance, that although Takazawa et al., Ball, or Fujioka do not explicitly disclose that the styrene/terpene resins function as hardening components, given that the resins are identical to those presently claimed, it would be natural for one of ordinary skill in the art to infer that these reference styrene/terpene resins intrinsically function as hardening components, and that in light of the motivation for using styrene/terpene resin disclosed by Takazawa et al., Ball, and Fujioka, it would have been obvious to one of ordinary skill in the art to use these resins in the hot melt ink of Breton et al. to produce a solid ink that has enhanced substrate adhesion, ink high transparency, controlled hardness, and good wear resistance, thereby arriving at the claimed invention. With respect to difference (b), the Examiner has stated that Takazawa et al. discloses the use of aromatic viscosity modifiers to control the viscosity of the ink so that the printer nozzles are not clogged. The Examiner is of the position that in light of the motivation for using viscosity modifier disclosed by Takazawa et al., it would have been obvious to one of ordinary skill in the art to use viscosity modifier in the ink of Breton et al. to produce an ink that does not clog the printer nozzles, and thereby arrive at the claimed invention.

Appellant disagrees with this position. Appellant points out that Breton et al. '607 discloses a completely different composition from that claimed in the instant application. As the Examiner has stated, the difference between Breton et al. '607 and the present claimed invention is the requirement in the claims of (a) styrene or terpene resin and (b) aromatic viscosity modifier. Since, in claim 1, the mandatory ink

ingredients are (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, and (c) a colorant, this statement is tantamount to conceding that the difference between Breton et al. '607 and the present claimed invention is that Breton et al. completely fails to teach or suggest the instantly claimed invention. One of ordinary skill in the art would not be motivated to combine the teachings of Breton et al. with the other cited references to arrive at a completely different ink composition from that disclosed in Breton et al. In addition, even if these references were viewed in combination, one of ordinary skill in the art would not be enabled thereby to arrive at the instantly claimed invention. Accordingly, Appellant is of the position that this reference, viewed either alone or in combination with Takazawa et al., Ball, and/or Fujioka, fails to render obvious the present invention as recited in claims 1 to 5, 7 to 9, 13, and 18 to 20.

Takazawa et al. is primarily directed to a specific colorant, and discloses the use of this colorant in various types of materials, including liquid inks, thermal transfer ribbons, and pressure sensitive transfer ribbons. The description of liquid inks, from column 6, line 41 to column 7, line 55, teaches inks containing the colorant, a non-volatile oily dissolution medium for the colorant, and, if necessary, a pigment dispersing agent and a viscosity adjusting agent, with examples of viscosity adjusting agents being mineral oils such as motor oil, synthetic oils such as olefin-polymerized oil, diester oils such as dioctyl phthalate, dioctyl sebacate, di(1-ethylpropyl) sebacate, dioctyl azelate, dioctyl adipate, and the like, and silicone oils. The portions of the reference

referred to by the Examiner at column 6, lines 46 to 50 (mentioning a dissolution medium for the dye or a dispersion medium for the pigment as a main component, and, if necessary, a pigment dispersing agent and a viscosity adjusting agent) and at column 7, lines 20 to 29 (mentioning component amounts of coloring agent 10 to 40 percent by weight, dye dissolution or pigment dispersion medium 20 to 60 percent by weight, pigment dispersing agent 0 to 40 and preferably 10 to 20 percent by weight, and viscosity adjusting agent 0 to 40 and preferably 20 to 30 percent by weight) refer to the liquid ink embodiment. The description of solid inks for thermal transfer and pressure sensitive transfer ink ribbons mentions, at column 8, lines 1 to 23, that the vehicle is composed of a wax-like substance or a mixture of a wax-like substance and a thermoplastic resin, with examples of the thermoplastic resin including ethylene-vinyl acetate copolymer, petroleum resin, polyvinyl acetate, polystyrene, styrene-butadiene copolymer, and acrylic resin. At column 8, lines 32 to 33, the reference states that the ink composition preferably has a melting or softening temperature of about 50° to about 150°C. Nothing in this reference, however, teaches or suggests a solid ink, or a hot melt ink, or a phase change ink, that contains a nonpolymeric aromatic viscosity modifier. Similarly, nothing in either Ball or Fujioka teaches or suggests a hot melt ink containing (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, and (c) a colorant. Accordingly, Appellant is of the position that these references, viewed either alone or in combination with Breton et al., fail to render obvious the present invention as recited in claims 1 to 5, 7 to 9, 13, and 18 to 20.

In response to Appellant's position to the effect that Breton et al. '607 discloses a completely different composition from that claimed in the instant application in that it fails to teach either (a) a styrene polymer or terpene polymer hardening component, or (b) a nonpolymeric aromatic viscosity modifier, the Examiner has stated that it is agreed that Breton et al. '607 does not explicitly disclose the use of a styrene or terpene polymer or a viscosity modifier, which is why the reference is used in combination with Takazawa et al., Ball, and Fujioka which teach that components such as styrene polymers, terpene polymers, and viscosity modifiers are conventionally used in hot melt inks to provide the ink with properties such as adhesion, hardness, suitable viscosity, and the like, and that in light of these teachings, and further given that the ink of Breton et al. '607 is open to the inclusion of other ingredients since it uses "comprising" language, the combination of Breton et al. '607 with Takazawa et al., Ball, and Fujioka et al. is proper.

Appellant disagrees with this position. The Examiner appears to have cited Breton et al. '607 solely because it has certain physical characteristics that are similar to those of the instantly claimed inks. The possibility that one of ordinary skill in the art could look at Takazawa et al., Ball, and Fujioka et al. in combination, derive therefrom a composition similar to that recited in instant claim 1, and then conclude that this ink would have physical characteristics similar to those of the Breton et al. '607 ink, which has a completely different composition, is so slight as to be insignificant. Further, as discussed hereinabove, since none of these references, viewed alone or in combination, teach or suggest an ink composition as recited in instant

claim 1, even if these references were viewed in combination, one of ordinary skill in the art would not be led to arrive at the present invention.

Further in response to Appellant's position to the effect that Breton et al. '607 discloses an entirely different composition from that presently claimed, the Examiner has stated that it is agreed that Breton et al. '607 does not disclose styrene or terpene resin or aromatic viscosity modifier as presently claimed, which is why it is used in combination with Takazawa et al., Ball, and Fujioka, all of which are drawn to hot melt inks, that the ink of Breton et al. '607 is open to the inclusion of other ingredients and nothing in Breton et al. '607 negates against using ingredients such as styrene resin or aromatic viscosity modifier, that there is motivation to combine Takazawa et al., Ball, and Fujioka with Breton et al. '607 including that they are all drawn to the same field of endeavor, and that in light of the above, and absent evidence to the contrary, it would have been obvious to one of ordinary skill in the art to use the styrene/terpene resin and aromatic viscosity modifier disclosed by Takazawa et al., Ball, and Fujioka in the ink of Breton et al. '607 and thereby arrive at the claimed invention.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The PTO has the burden under section 103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art

would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988); In re Newell, 891 F.2d 899, 13 U.S.P.Q. 2d 1248 (Fed. Cir. 1989); Ex Parte Levengood, 28 U.S.P.Q. 2d 1300 (Bd. Pat. App. & Int. 1993). Nothing in any of the cited references would lead one of ordinary skill in the art to view them in combination. Further, even if these references were viewed in combination, the combined teachings thereof would not lead one of ordinary skill in the art to arrive at the instant invention.

In response to Appellant's position to the effect that one of ordinary skill in the art would not be motivated to combine the teachings of Breton et al. '607 with the teachings of Ball, the Examiner has stated that given that Ball is drawn to hot melt ink as is Breton et al., and further given that Ball teaches the use of the same type and amount of resin presently claimed, i.e. styrene resin, and absent evidence to the contrary, it is the Examiner's position that there is ample motivation to combine Breton et al. '607 with Ball.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require Appellant to provide "evidence to the contrary" when no *prima facie* case of obviousness has been established. The PTO has the burden under section 103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the

art would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988). Since the Examiner has failed to make such a showing, Appellant remains of the position that the instant claims are patentable with respect to the teachings of these references.

I. Whether claim 6 is patentable under 35 U.S.C. §103(a) over Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka and further in view of Tobias et al.

The Examiner has stated that the difference between Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka and the present claimed invention is the requirement in the claims of conductivity, that Tobias et al., which is drawn to hot melt inks, discloses the use of conductivity agents to control the conductivity of the ink from 500 to 1500 microsiemens per centimeter or approximately 5.7 to 6.2 log(picomho/cm), which ensures that the ink has sufficient conductivity to be successfully ink jet printed, and that it would have been obvious to one of ordinary skill in the art to control the conductivity of the hot melt of Breton et al. '607 via the conductivity agents to produce an ink suitable for ink jet printing and thereby arrive at the claimed invention.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 7 to 9, 13, and 18 to 20 under §103 as being unpatentable over Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka, these references, viewed either alone or in combination, fail to render obvious the present invention. Tobias et al. teaches a hot melt ink containing an electrolyte and an

electrolyte solvating and dissociating compound for use in continuous ink jet printing. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber, and would not be led to arrive at such an ink that had a conductivity of no less than about 6 log(picomho/cm). Accordingly, Appellant is of the position that the present invention as recited in claim 6 is patentable with respect to these references.

J. Whether claims 10 to 12 are patentable under 35 U.S.C. §103(a) over Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka and further in view of Yaegashi et al., Wickramanayake, Malhotra et al. '117, and Breton et al. '599 (U.S. Patent 6,106,599).

The Examiner has stated that the difference between Breton et al. in view of Takazawa et al., Ball, and Fujioka and the present claimed invention is the requirement in the claims of specific type of viscosity modifier, that Yaegashi et al., which is drawn to hot melt inks, discloses the use of heat fusible substances such as dibenzofuran and 4-methylbiphenyl to produce an ink with excellent dischargeability, storability, and little blotting, that Wickramanayake, which is drawn to ink jet inks, discloses the use of phenanthrene as a solvent for the colorant and to prevent crust formation and nozzle clogging in the printer and

that although there is no disclosure of other specific types of phenanthrene one of ordinary skill in the art would have recognized that the broad disclosure of phenanthrene encompasses the use of specific types of phenanthrene such as those presently claimed and that the choice of these specific types of phenanthrene would have been within the bounds of routine experimentation, that Malhotra et al. '117, which is drawn to hot melt inks, discloses the use of 1-adamantane ethanol to ensure that the ink has low acoustic loss to minimize or reduce energy consumption of the printer and to generate high quality, lightfast, and waterfast images, that Breton et al. '599, which is drawn to a hot melt ink, discloses the use of phenylsulfonyl compounds to adjust the viscosity of the ink, and that in light of the motivation for using dibenzofuran, biphenyls, phenanthrene, and 1-adamantane ethanol disclosed by Yaegashi et al., Wickramanayake, Malhotra et al. '117, and Breton et al. '599, it would have been obvious to one of ordinary skill in the art to use these compounds in the hot melt ink of Takazawa et al. to produce a workable ink with excellent dischargeability, storeability, little blotting, which minimizes energy use with regards to the printer and does not clog the printer nozzles, thereby arriving at the claimed invention.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 7 to 9, 13, and 18 to 20 under §103 as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka, these references, viewed either alone or in combination, fail to render obvious the present invention.

In addition, Appellant points out that Wickramanayake is directed to a <u>liquid</u> ink jet ink composition. One of ordinary skill in the

art would not gain, from a reading of this reference, an understanding that the specific viscosity modifiers recited in claims 10 and 11 of the instant application would be suitable materials for modifying the melt viscosity of a hot melt ink composition of the present invention.

Further, Appellant points out that nothing in Breton et al. '599 teaches or suggests the use of 1,2-bis(phenylsulfonyl) ethylene, bis(phenylsulfonyl) methane, 1-bromomethyl-2-((phenylsulfonyl) methyl) benzene, or 2-(phenylsulfonyl)tetrahydropyran as viscosity modifiers in solid inks. Further, nothing in this reference teaches or suggests the addition of viscosity modifiers to ink compositions as recited in claim 1.

Additionally, Appellant points out that Yaegashi et al. discloses a solid ink ("recording material") that comprises a heat fusible solid substance and a colorant, and can optionally contain additives for adjusting ink properties and a normally liquid organic solvent such as an alcohol. Dibenzofuran and 4-methylbiphenyl are listed, among many other materials, as examples of the heat fusible solid substance. Nothing in this reference teaches or suggests that these materials, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as viscosity modifiers to modify the viscosity of the molten ink.

Appellant also points out that while Malhotra et al. '117 teaches an ink containing 1-adamantane ethanol, nothing in this reference teaches or suggests that this material, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as a viscosity modifier to modify the viscosity of the molten ink.

For these additional reasons, Appellant is also of the position that Breton et al. '607, Takazawa et al., Ball, and Fujioka, viewed in combination with Yaegashi et al., Wickramanayake, Malhotra et al. '117, and/or Breton et al. '599 fail to render obvious the present invention as recited in claims 10 and 11.

In response to Appellant's position to the effect that Wickramanayake is drawn to liquid inks and thus there is no motivation to combine this reference with the solid ink reference of Breton et al. '607, the Examiner has stated that given that it is well known in the art that hot melt inks contain liquid vehicles and further given, as disclosed in Takazawa et al., that the ingredients for liquid inks and solid inks overlap, i.e. viscosity modifier, colorant, dispersant, etc., it is the Examiner's position that there is ample motivation to combine Wickramanayake with Breton et al '607.

Appellant disagrees with this position. Nothing in the cited references teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Similarly, while Takazawa et al. teaches that the colorant which is the subject thereof can be used in both liquid inks and in solid inks for thermal transfer ribbons and pressure-sensitive transfer ribbons, nothing in this reference teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Liquid ink jet inks and solid ink jet inks have different characteristics, different requirements, and different design difficulties; those of ordinary skill in the art would not be led to the conclusion that one specific

component of one specific liquid ink should be taken and added to another specific solid ink, or that by so doing advantageous results would occur.

Further in response to Appellant's position to the effect that Wickramanayake is drawn to liquid inks and thus there is no motivation to combine this reference with the solid ink reference of Breton et al. '607, the Examiner has stated that Appellant has provided no clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks, and that Wickramanayake is used as a teaching reference, so it is not necessary for the secondary references to contain all the features of the presently claimed invention. The Examiner has stated that this reference teaches a certain concept, and in combination with the primary reference, discloses the presently claimed invention.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require Appellant to "provide . . . clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks". The references cited by the Examiner fail to teach or suggest to one of ordinary skill in the art the ink compositions recited in the instant claims. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally

available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988); In re Newell, 891 F.2d 899, 13 U.S.P.Q. 2d 1248 (Fed. Cir. 1989); Ex Parte Levengood, 28 U.S.P.Q. 2d 1300 (Bd. Pat. App. & Int. 1993). The Examiner has failed to make such a showing. Appellant, accordingly, is of the position that the present invention is patentable with respect to the teachings of these references.

In response to Appellant's position regarding Malhotra et al. '117 and Yaegashi et al., the Examiner has stated that, given that 1-adamantane ethanol disclosed by Malhotra et al. '117, the dibenzofuran and 4-methylbiphenyl disclosed by Yaegashi et al., and the diphenyl carbonate and glutaric acid disclosed by Yaegashi et al. are identical to those presently claimed, it would have been obvious to one of ordinary skill in the art that the 1-adamantane, dibenzofuran, and 4-methylbiphenyl ethanol would intrinsically function as viscosity modifiers and that the diphenyl carbonate and glutaric acid would intrinsically function as dispersing agents.

Appellant points out, however, that nothing in any of these references teach that these materials should be added to an ink composition as recited in claim 1 of the present application. Those of ordinary skill in the art would not be led to the conclusion that one specific component of one specific ink should arbitrarily be taken and added to another specific ink, or that by so doing advantageous results would occur. There would be no motivation for one of ordinary skill in the art to add these materials to an ink according to claim 1 of the present application. Further, since, as discussed hereinabove, Breton et

al. '607 fails to teach or suggest an ink according to claim 1 of the present application, even if these references were viewed in combination with Breton et al. '607, one of ordinary skill in the art would not be led to arrive at the present invention as recited in claims 10 and 11.

Further in response to Appellant's position to the effect that one of ordinary skill in the art would have no motivation to combine the viscosity modifiers of Malhotra et al. '117 or Yaegashi et al. with Breton et al. '607, the Examiner has stated that Yaegashi et al., which is drawn to hot melt inks, discloses the use of heat fusible substances such as dibenzofuran and 4-methylbiphenyl to produce an ink with excellent dischargeability, storability, and little blotting while Malhotra et al. '117, which is drawn to hot melt inks, discloses the use of 1-adamantane ethanol to ensure that the ink has low acoustic loss to minimize or reduce energy consumption of the printer and to generate high quality, lightfast, and waterfast images. The Examiner is of the position that given that both Yaegashi et al. and Malhotra et al. '117 are drawn to the same field of endeavor as Breton et al. '607 and both Yaegashi et al. and Malhotra et al. '117 provide motivation for using the above described ingredients in these hot melt inks, and absent evidence to the contrary, it would have been obvious to one of ordinary skill in the art to use such viscosity modifiers in the ink of Breton et al. '607 and thereby arrive at the claimed invention.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion,

unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require Appellant to provide "evidence to the contrary" when no *prima facie* case of obviousness has been established. The PTO has the burden under section 103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988). Since the Examiner has failed to make such a showing, Appellant remains of the position that the instant claims are patentable with respect to the teachings of these references.

K. Whether claims 16 and 17 are patentable under 35 U.S.C. §103(a) over Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka and further in view of JP 06 228 476, Yaegashi et al., and Malhotra et al. '390.

The Examiner has stated that the difference between Breton et al. in view of Takazawa et al., Ball, and Fujioka and the present claimed invention is the requirement in the claims of a specific type of dispersing agent, that the abstract of the Japanese reference discloses the use of 2-oxazolidone to produce an ink with excellent humectant properties and discharge stability, that Yaegashi et al., which is drawn to hot melt inks, discloses the use of 2,3-dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione to produce an ink with excellent dischargeability, storability, and little blotting, that Malhotra et al. '390, which is drawn to hot melt inks,

discloses the use of cyclohexanone and cyclohexanedione to control the acoustic loss value of the ink, that Yaegashi et al. and Malhotra et al. '390 broadly disclose benzaldehydes, glutaric acids, cyclohexanone, and cyclohexanedione, that although there are no specific examples of these compounds in the references one of ordinary skill in the art would have recognized that the broad disclosure of these compounds encompasses the use of specific types of these compounds such as those presently claimed, and that the choice of these specific types would have been within the bounds of routine experimentation, that Yaegashi et al. discloses 2,3-dimethoxybenzaldehyde while the present claims require 2,6-dimethoxybenzaldehyde, that the only difference between the reference compound and those presently claimed are the position of the substituents and one of ordinary skill in the art would expect the dimethoxybenzaldehyde to function in the same manner regardless of the position of the substituents, and that in light of the motivation of using the compounds disclosed by these references, it would have been obvious to one of ordinary skill in the art to use these compounds in the hot melt ink of Takazawa et al. to produce an ink with suitable acoustic loss value, excellent humectant properties, and discharge stability, thereby arriving at the claimed invention.

Appellant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 7 to 9, 13, and 18 to 20 under §103 as being unpatentable over Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka, these references, viewed either alone or in combination, fail to render obvious the present invention.

In addition, Appellant points out that JP 06 228 476 is directed to a liquid ink jet ink composition. One of ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific colorant dispersing agents recited in claim 17 of the instant application would be suitable materials for inclusion in a hot melt ink composition of the present invention.

Further, Appellant points out that Yaegashi et al. discloses a solid ink ("recording material") that comprises a heat fusible solid substance and a colorant, and can optionally contain additives for adjusting ink properties and a normally liquid organic solvent such as an alcohol. 2,3-Dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione are listed, among many other materials, as examples of the heat fusible solid substance. Nothing in this reference teaches or suggests that 2,6-dimethoxybenzaldehyde, diphenyl carbonate, 2,2-dimethyl glutaric acid, 3,3-dimethylglutaric acid, 1-(2-hydroxyphenyl)-3-phenyl-1,3-propanedione, or 1-(2-hydroxy-5-methylphenyl)-3-phenyl-1,3-propanedione, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as colorant dispersing agents. With respect to the Examiner's comment that "one of ordinary skill in the art would expect the . . . dimethoxybenzaldehyde to function in the same manner regardless of the position of the substituents," Appellant points out that 2,3-dimethoxybenzaldehyde has a melting point of 48 to 52°C and a boiling point of 137°C, whereas 2,6-dimethoxybenzaldehyde has a melting point of 96 to 98°C and a boiling point of 285°C; these

materials could be expected by one of ordinary skill in the art to behave differently in a hot melt ink.

Additionally, Appellant points out that Malhotra et al. '390 at column 1, lines 37 and 42 to 43 and column 5, line 7 teaches 4-ethylcyclohexanone and 2-acetylcyclohexanone as examples of the liquid ketone vehicle of the ink disclosed therein. While the reference further teaches at column 5, line 13 1,2-cyclohexanedione as an example of the solid ketone component of the ink disclosed therein, this teaching cannot be said fairly to teach or suggest the use of 2,6-diphenylcyclohexanone or 4,4-dimethyl-1,3-cyclohexanedione in an ink according to the present invention.

For these additional reasons, Appellant is also of the position that Breton et al. '607 in view of Takazawa et al., Ball, and Fujioka, viewed in combination with JP 06 228 476, Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and/or Malhotra et al. '390, fail to render obvious the present invention as recited in claims 16 and 17.

In response to Appellant's position to the effect that JP 06 228 476 is drawn to liquid inks and thus there is no motivation to combine this reference with the solid ink reference of Breton et al. '607, the Examiner has stated that given that it is well known in the art that hot melt inks contain liquid vehicles and further given, as disclosed in Takazawa et al., that the ingredients for liquid inks and solid inks overlap, i.e. viscosity modifier, colorant, dispersant, etc., it is the Examiner's position that there is ample motivation to combine JP 06 228 476 with Breton et al '607.

Appellant disagrees with this position. Nothing in the cited references teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Similarly, while Takazawa et al. teaches that the colorant which is the subject thereof can be used in both liquid inks and in solid inks for thermal transfer ribbons and pressure-sensitive transfer ribbons, nothing in this reference teaches or suggests that components present in liquid ink jet inks can or should be added to solid ink jet inks, or that desirable results will necessarily result therefrom. Liquid ink jet inks and solid ink jet inks have different characteristics, different requirements, and different design difficulties; those of ordinary skill in the art would not be led to the conclusion that one specific component of one specific liquid ink should be taken and added to another specific solid ink, or that by so doing advantageous results would occur.

Further in response to Appellant's position to the effect that JP 06 228 476 is drawn to liquid inks and thus there is no motivation to combine this reference with the solid ink reference of Breton et al. '607, the Examiner has stated that Appellant has provided no clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks, and that JP 06 228 476 is used as a teaching reference, so it is not necessary for the secondary reference to contain all the features of the presently claimed invention. The Examiner has stated that this reference teaches a certain concept, and in combination with the primary reference, discloses the presently claimed invention.

Appellant disagrees with this position. Appellant again points out that the burden of establishing a case of obviousness rests with the Examiner, and that the Examiner may not make an assertion, unsupported by facts, of unpatentability and require Appellant to provide evidence to rebut the assertion. The Examiner cannot require Appellant to "provide . . . clear and convincing evidence that components present in liquid ink jet inks cannot be added to solid ink jet inks". The references cited by the Examiner fail to teach or suggest to one of ordinary skill in the art the ink compositions recited in the instant claims. The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988); In re Newell, 891 F.2d 899, 13 U.S.P.Q. 2d 1248 (Fed. Cir. 1989); Ex Parte Levengood, 28 U.S.P.Q. 2d 1300 (Bd. Pat. App. & Int. 1993). The Examiner has failed to make such a showing. Appellant, accordingly, is of the position that the present invention is patentable with respect to the teachings of these references.

In the rejections of the claims under §103, the Examiner appears to have considered various portions of the references cited, in each instance viewing the cited portion in isolation from the context of the entire reference, and combined these isolated portions to arrive at the present invention with the benefit of hindsight. Using hindsight or

applying the benefit of the teachings of the present application when determining obviousness, however, is impermissible; the references applied must be reviewed without hindsight, must be reviewed as a whole, and must suggest the desirability of combining the references. Lindemann Maschinenfabrik v. American Hoist & Derrick Co., 221 U.S.P.Q. 481 (Fed. Cir. 1984). None of the cited references suggests or teaches the desirability of combining the elements of the present invention as claimed. Obviousness cannot be established by combining references to arrive at the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. In re Geiger, 2 U.S.P.Q. 2d 1276 (Fed. Cir. 1987); Carella v. Starlight Archery and Pro Line Co., 804 F.2d 135, 231 U.S.P.Q. 644 (Fed. Cir. 1986); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 U.S.P.Q. (BNA) 929 (Fed. Cir. 1984). When determining patentability under §103, the Examiner must consider the invention as a whole, and cannot view each element of the claim separately with respect to the prior art. See, e.g., Jones v. Hardy, __ F.2d __, 220 U.S.P.Q. 1021 (BNA) (Fed. Cir. 1984). When prior art references require selective combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. Uniroyal Inc. v. Rudkin Wiley Corp., __ F. 2d __, 5 U.S.P.Q. 2d 1435 (Fed. Cir. 1988); Interconnect Planning Corp. v. Feil, 774 F. 2d 1132, 227 U.S.P.Q. 543 (Fed. Cir. 1985). It is impermissible to use the claims as a frame and the prior art references as a mosaic to piece together a facsimile of the claimed invention. Uniroyal Inc. v. Rudkin Wiley Corp., __ F. 2d __, 5 U.S.P.Q. 2d 1435 (Fed. Cir. 1988); W. L.

Gore and Associates, Inc. v. Garlock, Inc., 721 F. 2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983).

Appellant directs the attention of the Board of Appeals to Ex Parte Levengood, 28 USPQ 2d 1300 (Bd. Pat. App. & Int. 1993), in which the Board reversed the rejection of all claims "because the examiner has used the wrong standard of obviousness.":

> "Obviousness is a legal conclusion, the determination of which is a question of patent law. In re Papesch, 315 F.2d 381, 137 USPQ 43 (CCPA 1963). In order to establish a *prima facie* case of obviousness, it is necessary for the examiner to present evidence[1], preferably in the form of some teaching, suggestion, incentive or inference in the applied prior art, or in the form of generally available knowledge, that one having ordinary skill in the art would have been led to combine the relevant teachings of the applied references in the proposed manner to arrive at the claimed invention. See, for example, Carella v. Starlight Archery, 804 F.2d 135, 231 USPQ 644 (Fed. Cir. 1986); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 USPQ 657 (Fed. Cir. 1985).
>
> ...
>
> "...the examiner may provide an explanation based on logic and sound scientific reasoning that will support a holding of obviousness. In re Soli, 317 F.2d 941, 137 USPQ 797 (CCPA 1963)[2]...
>
> ...
>
> "In this case, however, the only suggestion for the examiner's combination of the isolated teachings of the applied references improperly stems from appellant's disclosure and not from the applied prior art. In re Ehrreich, 590 F.2d 902, 200 USPQ 504 (CCPA 1979). At best, the examiner's comments regarding obviousness amount to an assertion that one of ordinary skill in the relevant art would have been able to arrive at appellant's invention because he had the necessary skills to

carry out the requisite process steps. This is an inappropriate standard for obviousness. See Orthokinetics Inc. v. Safety Travel Chairs Inc., 806 F.2d 1565, 1 USPQ 2d 1081 (Fed. Cir. 1986). That which is within the capabilities of one skilled in the art is not synonymous with obviousness. Ex Parte Gerlach, 212 USPQ 471 (Bd. App. 1980). ... That one can reconstruct and/or explain the theoretical mechanism of an invention by means of logic and sound scientific reasoning does not afford the basis for an obviousness conclusion unless that logic and reasoning also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the references to make the claimed invention.

"Our reviewing courts have often advised the Patent and Trademark Office that it can satisfy the burden of establishing a *prima facie* case of obviousness only by showing some objective teaching in either the prior art, or knowledge generally available to one of ordinary skill in the art, that 'would lead' that individual 'to combine the relevant teachings of the references.' In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). In re Newell, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989). Accordingly, an examiner cannot establish obviousness by locating references which describe various aspects of a patent applicant's invention without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done."

1. The importance of evidence in the examination process is set forth in the following quotation from In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984): "The Supreme Court in Graham v. John Deere Co., 383 U.S. 1, 148 U.S.P.Q. 459 (1966), focused on the procedural and evidentiary processes in reaching a conclusion under section 103. As adapted to ex parte procedure, Graham is interpreted as continuing to place the 'burden of proof on the Patent Office which requires it to produce the factual basis for its rejection of an application under sections 102 and 103'. In re Warner, 379 F.2d 1011, 1016, 154 USPQ 173,

177 (CCPA 1967). After a *prima facie* case of obviousness has been established, the burden of going forward shifts to the applicant.

2. Preferably the examiner's explanation should be such that it provides that impetus necessary to cause one skilled in the art to combine the teachings of the references to make the proposed modification. In re Albrecht, 514 F.2d 1385, 185 USPQ 585 (CCPA 1975).

As the Court of Appeals for the Federal Circuit recently stated in Yamanouchi Pharmaceutical Co. v. Danbury Pharmacal Inc., 56 USPQ2d, 1641 (Fed. Cir. 2000) at 1644:

> This court has recently reemphasized the importance of the motivation to combine:
>
> > As this court has stated, "virtually all (inventions) are combinations of old elements." Therefore, an examiner (or accused infringer) may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner (or accused infringer) to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention.
> >
> > . . . .
> >
> > . . . To counter this potential weakness in the obviousness construct, the suggestion to combine requirement stands as a critical safeguard against

> hindsight analysis and rote application of the legal test for obviousness.
>
> In re Rouffet, 149 F.3d 1350, 1357-58, 47 USPQ2d 1453, 1457 (Fed. Cir. 1998) (internal citations omitted).

For the instant application, the Examiner also appears to have attempted to use the claimed invention as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. This method is clearly impermissible. Nothing in any of the cited references teaches or suggests the combination of elements recited in the instant claims. Appellant asserts that in the instant §103 rejections, the only suggestion for the Examiner's combination of the isolated teachings of the applied references improperly stems from Appellant's disclosure and not from the applied prior art, and accordingly is of the position that the present invention is patentable with respect to the cited references.

CONCLUSION:

For the reasons set forth herein, Appellant is of the position that the claims of the present application are patentable with respect to the prior art cited by the Examiner, and accordingly respectfully requests that the Board of Patent Appeals and Interferences reverse the Examiner's rejections of the claims.

Respectfully submitted,

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9. APPENDIX:

CLAIMS APPEALED:

The following are the appealed claims:

1. A hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber.

2. An ink composition according to claim 1 wherein the ink has a melting point of no lower than about 60°C and no higher than about 140°C.

3. An ink composition according to claim 1 wherein the ink has a melt viscosity at jetting temperature of no higher than about 25 centipoise.

4. An ink composition according to claim 1 wherein the ink undergoes, upon heating, a change from a solid state to a liquid state in a period of no more than about 100 milliseconds.

5. An ink composition according to claim 1 wherein the ink exhibits an acoustic-loss value of no more than about 100 decibels per millimeter.

6. An ink composition according to claim 1 wherein the ink exhibits a conductivity of no less than about 6 log(picomho/cm).

7. An ink composition according to claim 1 wherein images generated with the ink exhibit a haze value of no more than about 25.

8. An ink composition according to claim 1 wherein the hardening component is poly (α-methyl styrene), poly (vinyl toluene-co-α-methyl styrene), poly (methyl styrene-co-indene) hydrogenated, poly (styrene-co-allyl alcohol), polylimonene, poly-β-pinene, poly(coumarone-co-indene), or mixtures thereof.

9. An ink composition according to claim 1 wherein the hardening component is present in the ink in an amount of no less than about 0.5 percent by weight of the ink and no more than about 28 percent by weight of the ink.

10. An ink composition according to claim 1 wherein the viscosity modifier is a biphenyl compound, a fluorene compound, a phenanthrene compound, a pyrene compound, an adamantane compound, a dibenzo compound, a diphenyl phosphino compound, a phenylsulfonyl compound, or mixtures thereof.

11. An ink composition according to claim 1 wherein the viscosity modifier is biphenylene, 4-acetylbiphenyl, 2-biphenyl carboxylic acid, 2,2'-biphenyldimethanol, 4,4'-dimethyl biphenyl, 2,2'-bis (bromomethyl)-1,1'-biphenyl, 4,4'-bis (dimethylamino) biphenyl carbinol, 4-bromo biphenyl, diphenylfulvene, diphenyl sulfone, 1,2-diphenoxy ethane, triphenyl methane, fluorene, 9-fluorene methanol, 9-fluorene acetic acid, 3-amino fluoranthene, 1-amino fluorene, 2-amino fluorene, 9-bromo-9-phenylfluorene, 1-methyl fluorene, methyl-9-fluorenylidene acetate, 4,4'-(9-fluorenylidene) bis(2-phenoxy ethanol), N-(9-fluorenyl methoxy carbonyl)-valinol, 9-fluorenone, phenanthrene, 9-iodophenanthrene, 9-acetylphenanthrene, 9-amino phenanthrene, 1-amino pyrene, 1-acetylpyrene, 1-bromopyrene, 1-(bromoacetyl) pyrene, 1,2,3,6,7,8-hexa hydropyrene, 1-pyrenemethanol, 1-pyrenebutanol, 1-adamantane methanol, 1-adamantane ethanol, 1-bromo adamantane, 2-bromo adamantane, 1-iodo adamantane, 2-(1-adamantyl)-4-methyl phenol, 1-bromo-3-(bromomethyl) adamantane, 1-bromo-3,5-dimethyl adamantane, 3-(bromomethyl)-2,4,10-trioxa adamantane, 1,3-dibromoadamantane, 1,4-dibromoadamantane, dimethyl-1,3-adamantane dicarboxylate, 1-azido adamantane, 3-noradamantane carboxylic acid, 1-adamantyl bromomethyl ketone, dibenzo-24-crown-8, dibenzo-30-crown-10, dibenzofuran, dibenzosuberane, dibenzosuberenol, dibenzosuberol, dibenzosuberenone, dibenzothiophene, diphenylfulvene, 1,3-diphenyl isobenzofuran, bis(diphenylphosphino) methane, 1,2-bis(diphenylphosphino) ethane, 1,2-bis(diphenylphosphino) ethylene, 1,4-bis(diphenylphosphino) butane, 2,3-bis(diphenylphosphino) butane, 1,6-bis(diphenyl phosphino) hexane, 1,1,1-tris(diphenyl phosphino methyl)

ethane, 1,4-bis(dicyclohexyl phosphino) butane, 1,2-bis(phenylsulfonyl) ethylene, bis(phenylsulfonyl) methane, 1-bromomethyl-2-((phenylsulfonyl) methyl) benzene, 2-(phenylsulfonyl)tetrahydropyran, or mixtures thereof.

12. An ink composition according to claim 1 wherein the viscosity modifier is present in the ink in an amount of no less than about 0.5 percent by weight of the ink and no more than about 45 percent by weight of the ink.

13. An ink composition according to claim 1 wherein the colorant is a dye.

14. An ink composition according to claim 1 containing an ink vehicle in an amount of no less than about 0.5 percent by weight of the ink and no more than about 70 percent by weight of the ink.

15. An ink composition according to claim 1 containing an ink vehicle which is 4-hexyl resorcinol, 4-dodecyl resorcinol, 4-(tert-octyl) phenol, 4-bromo-N-dodecyl-1-hydroxy-2-naphthalene carboxamide, 2,2-diphenyl-1,4-diazaspiro-(4,5)deca-1,3-diene, N,N'-dibenzyl-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, 1,4-dihydro-9-isopropylidene-1,4-methanonaphthalene, 1,4,4a,8a-tetrahydro-endo-1,4-methanonaphthalene, 1,5-dihydroxy-1,2,3,4-tetrahydronaphthalene, 2,5-difluorophenylhydrazine, or mixtures thereof.

16. An ink composition according to claim 1 containing a colorant dispersing agent in an amount of no less than about 1 percent by weight of the ink and no more than about 50 percent by weight of the ink.

17. An ink composition according to claim 1 containing a colorant dispersing agent which is 2-hydroxyisocaproic acid, 2-hydroxy isobutyric acid, benzylmalonic acid, dibenzoyltartaric acid, methylsuccinic acid, 2-ethyl-2-methylsuccinic acid, 2,2-dimethyl glutaric acid, 3,3-dimethylglutaric acid, 1-hydroxy-1-cyclopropane carboxylic acid, 2,2,3,3-tetramethyl cyclopropane carboxylic acid, 1-benzo cyclobutane carboxylic acid, 3-oxo-1-indan carboxylic acid, 2-oxo-6-pentyl-2H-pyran-3-carboxylic acid, diphenyl carbonate, 1,2-diphenylvinylene carbonate, 2-oxazolidone, flavone, 4-methoxy chalcone, 4'-methoxy chalcone, γ-(2-naphthyl)-γ-butyrolactone, diphenyl-γ-butyrolactone, 2,6-dimethyl-4H-pyran-4-one, distyryl ketone, 4-(4-hydroxyphenyl)-2-butanone, 1,3-diacetyl-2-imidazolidinone, 2,6-diphenyl cyclohexanone, flavanone, 1-(2-hydroxyphenyl)-3-phenyl-1,3-propanedione, 1-(2-hydroxy-5-methylphenyl)-3-phenyl-1,3-propanedione, tetramethyl-1,3-cyclobutanedione, 2,5-oxazolidinedione, 5,5-dimethyloxazolidine-2,4-dione, 3,6-dimethyl-1,4-dioxane-2,5-dione, 2,2-dimethyl-1,3-dioxane-4,6-dione, 4,4-dimethyl-1,3-cyclohexanedione, benzylphenyl ketone, di-n-benzyl ketone, diphenyl acetone, poly (vinyl phenyl ketone), poly (vinyl phenyl ketone) hydrogenated, polycyclohexanone, poly(coumarone-co-indene), polycaprolactone, poly(ethylene-co-carbon monoxide), poly(1-vinylpyrollidone)-graft-(1-triacontene), 3-hydroxybenzaldehyde, 4-hydroxybenzaldehyde, 4-benzyloxybenzaldehyde, 2-carboxybenzaldehyde, 4-nitrobenzaldehyde, 2,3-dihydroxybenzaldehyde, 2,5-dihydroxybenzaldehyde, 3-hydroxy-4-methoxybenzaldehyde, 4-hydroxy-3-methoxybenzaldehyde, 4-hydroxy-3-ethoxybenzaldehyde, 4-hydroxy-3-methylbenzaldehyde, 2-hydroxy-5-

nitrobenzaldehyde, 3-hydroxy-4-nitrobenzaldehyde, 4-hydroxy-3-nitrobenzaldehyde, 3,4-dibenzyloxy benzaldehyde, 3,5-dibenzyloxybenzaldehyde, 4-acetoxy-3,5-dimethoxybenzaldehyde, 2-amino-3,5-dibromobenzaldehyde, 2-benzyloxy-4,5-dimethoxybenzaldehyde, 5-bromo-2-hydroxy-3-methoxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehde, 2,3,5-trichlorobenzaldehyde, 2,3,6-trichlorobenzaldehyde, 2,4,5-trimethoxybenzaldehyde, 2,4,6-trimethoxybenzaldehyde, 3,5-dichloro-2-hydroxybenzaldehyde, 3,5-dibromo-2-hydroxybenzaldehyde, 3,5-diiodo-2-hydroxybenzaldehyde, 3,4-dihydroxy-5-methoxybenzaldehyde, 3,5-dimethyl-4-hydroxybenzaldehyde, 2,6-dimethoxybenzaldehyde, trans-2-nitro cinnamaldehyde, trans-4-(diethylamino) cinnamaldehyde, 4-acetoxy-3-methoxy cinnamaldehyde, 4-hydroxy-3-methoxy cinnamaldehyde, 2-hydroxy-1-naphthaldehyde, 2-methoxy-1-naphthaldehyde, 9-anthraldehyde, 5-bromo-2-furaldehyde, 5-nitro-2-thiophene carboxaldehyde, 9-ethyl-3-carbazole carboxaldehyde, 4-stillbenecarboxaldehyde, 2-hydroxy-5-methyl-1,3-benzene dicarboxaldehyde, terephthal dicarboxaldehyde, 2-(diphenylphosphino) benzaldehyde, 1-(phenylsulfonyl)-2-pyrrolecarboxaldehyde, 1-pyrene carboxaldehyde, phenanthrene carboxaldehyde, 2-fluorenecarboxaldehyde, poly ((phenyl glycidyl ether)-co-formaldehyde), poly ((o-cresyl glycidyl ether)-co-formaldehyde), poly (p-toluenesulfonamide-co-formaldehyde), or mixtures thereof.

18. A printing process which comprises incorporating an ink according to claim 1 into an ink jet printing apparatus, melting the ink, and causing droplets of the melted ink to be ejected in an imagewise pattern onto a recording sheet.

19. A process according to claim 18 wherein the printing apparatus employs an acoustic ink jet process, wherein droplets of the ink are caused to be ejected in imagewise pattern by acoustic beams.

20. A process according to claim 18 wherein the printing apparatus employs an acoustic ink jet printing process wherein droplets of the ink are formed by acoustic beams without imparting a substantial velocity component toward the print medium, using a droplet forming force that is sufficient only to form the ink droplets, and wherein the printing process further comprises generating an electric field to exert an electrical force different from the droplet forming force on the ink droplets to move the ink droplets toward the print medium, and controlling the electrical force exerted on the formed complete ink droplets by the electric field.

21. A hot melt ink composition consisting essentially of (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber.